Q27. BIOMEDICAL GRADUATE STUDIES
Graduate Group Submitting Proposal

GGEB

Q1. Date of Proposal

5/28/2024

Q2. Name of Submitter (First and Last Name)

Eli Elliott/Adam Naj

Q3. Course Title

Biostatistical Methods for Epidemiology

Q4. Course Number

BSTA 6100

Q5. Course Description

This one-semester course is designed to provide a strong foundation in biostatistical methods for epidemiologic research, intended for students entering a PhD program in epidemiology. Covered topics include introductory probability theory, estimands, large-sample theory, hypothesis testing, confidence intervals, linear regression, generalized linear models, models for correlated data, and survival analysis, all with a throughline of likelihood-based inference. The course will consist of interactive lectures and labs designed to develop hands-on analytic skills.

Q6. Course Format (e.g. lecture, seminar)

Seminar

Q7. Start Term (e.g. fall 2020)

Fall 2024

Q8. Course Director (primary contact for course - First and last name, academic title, office address, phone and email)

Nicholas Seewald, Assistant Professor of Biostatistics, 624 Blockley Hall, seewaldn@pennmedicine.upenn.edu

Q9. Course Co-Director (optional, same information as above)

NA

Q10. Cross Listed with (name of graduate group you are cross listing with, if applicable)

NA

Q11. Course Schedule (e.g. days and times per week)

T/Th, twice per week

Q12. Term(s) Offered (e.g. spring, even number semesters)

Every fall

Q13. Course Units per Term (1cu=~3 contact hours per week)

1.0

Q14. Pre-requisites (e.g. BIOM 600 or equivalent)

Single variable calculus, prior coursework in statistics at the UG level, linear algebra at the UG level CoRequisite: EPID 7010: Intro to Epidemiologic Research

Q15. Enrollment Restrictions (e.g. instructor permission)

Instructor Permission

Q16. Course Materials (e.g. recommended textbook, laptop required)

Access to computer running R, RStudio, and Quarto

Q17. Evaluation of Student Performance (e.g. class participation 40%, exams 20%, presentations 20%)

Labs and Problem Sets – 70% Final Exam – 30%

Q18. Anticipated Number of Students (min/max)

5-7

Q19. Anticipated Type Student (e.g. CAMB MD/PhD, 1st year, 2nd year, pre or post prelim)

Epi PhD 1st Years

Q20.
Learning Objectives
(example: Three learning objectives have been developed for this course: (i) Provide students with the understanding of basic statistical concepts; nearly all scientific studies result in quantitative data making it important to know the basics of statistics when conducting an independent research project; (ii) Help students develop techniques and/or strategies for reviewing and/or critiquing statistical aspects of study design and implementation presented in scientific literature; and (iii) Improve the analytical skill set needed by students to design and conduct a simple research experiment. It is important that students engaged in scientific experiments understand the principles of good study design and be able to conduct basic statistical analysis of the data collected.)

1. Explain and implement key statistical concepts that underlie data analysis for epidemiologic research; 2. Understand principles of statistical estimation and inference, including asymptotic properties, hypothesis testing, and interval estimation; 3. Implement data analyses in R, perform appropriate diagnostic checks, and report and interpret results in a reproduceable format; 4. Translate acquired biostatistical knowledge to novel research contexts.

Q21.
Course Competencies
(example: The course emphasizes the following core competencies: knowledge within program area (biostatistical methods and models); research skills (study planning, data interpretation, reading and understanding published research); quantitative and computational methodologies (data analysis; programming and computing); communication (writing and presentation skills).

1. Development of statistical intuition for understanding randomness and its role in epidemiologic research 2. Statistical problem-solving skills broadly applicable in epidemiologic research contexts 3. Proficiency in writing descriptions of analyses and results in appropriate scientific context

Q22.
Scientific Rigor and Reproducibility
(example: Through in-depth reading and evaluation of research literature, this course will provide instruction on rigorous experimental design and data interpretation.)

This course is designed to teach students how to select and apply appropriate statistical methods to addressquestions in epidemiology in a transparent and reproducible way through clear presentation of results, conclusions, and statistical programming.

Q23.
Outcomes
(example: After completion of the course, students should be able to develop an appropriate study plan to explore a biomedical research question and execute a general statistical analysis for data collected in a study. Specifically, the students should be able to produce descriptive tables of the data, select the appropriate statistical tests, perform them using a statistical computing program, and to summarize findings and interpret the results. In addition, students will learn how to read, interpret, and critically evaluate statistical concepts in the literature. Students will gain experience in designing and analyzing a research study which will enhance several key competencies that are an important part of their PhD training.

By the end of the semester, students will be able to: 1. Explain and implement key statistical concepts that underlie data analysis for epidemiologic research; 2. Understand principles of statistical estimation and inference, including asymptotic properties, hypothesis testing, and interval estimation; 3. Implement data analyses in R, perform appropriate diagnostic checks, and report and interpret results in a reproduceable format; 4. Translate acquired biostatistical knowledge to novel research contexts.

Q24.
Course Format
(example: The course will be 1-credit and meet once a week for 3 hours for a total of 14 weeks. The course will be offered every spring semester with the class scheduled on Wednesday 8:30-11:30 am. This course is presented in a series of weekly modules. For each week, specific sections of the textbook which are to be covered will be listed in the syllabus. Weekly homework assignments will be given. They will be graded. The purpose of the homework assignments is to acquire mastery of the statistical concepts used in research applications and the use of the computer software R for statistical calculations and presentation. The focus will be on use, interpretation, and concepts rather than on memorization of formulae. Final exam may include a take-home project as well as a test taken during the last session of the course. Students are expected to attend all class sessions and actively participate.)

The course will be a 1 unit core course and will run every fall. It will meet Tuesdays and Thursdays from 10:15-11:45 through the semester. The syllabus outlines the concepts/methods the students will learn each week. Students will be given weekly problem sets or mini-projects; these will be graded. Active engagement in the course is expected. This can be demonstrated in a number of ways, including consistent class attendance, participation in discussion forums, attending office hours, etc.

Q25. Rationale/Additional Comments for the Proposal for the Biomedical Curriculum and Student Academic Standards Committee - BCC

The course introduces students to core Biostatistical methods that are essential to their development as epidemiologists. It compliments EPID 7010: Introduction to Epidemiologic Methods, which the 1st year Epidemiology PhD students will take concurrently, and which will apply the concepts learned in BSTA 6100 to real-world epidemiological problems.

Location Data

Location: (39.9792, -75.1279)

Source: GeoIP Estimation